JERROLD®

INDUSTRIAL PRODUCTS DIVISION

LOG AMPLIFIER
MODEL LA-5100

JERROLD ELECTRONICS CORPORATION

INSTRUCTION MANUAL

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RF PRECISION LOG AMPLIFIER

MODEL LA-5100

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SECTION I

INTRODUCTION

1-1 Scope

This publication contains operational and service instructions together with an electronic parts list and schematics for the Jerrold Precision RF Logarithmic Amplifier Model LA-5100.

1-2 Description

The Jerrold Precision RF Logarithmic Amplifier Model LA-5100 is used in making measurements over the 500 kc to 100 mc range of the response of networks, filters and amplifiers, etc., which exhibit dynamic operating ranges down to 85 db. The unit comprises a nine-stage band-pass amplifier, a dc automatic gain control amplifier, a detector with low impedance output for scope or X-Y recorder, an output meter, and a regulated power supply.

The amplifier develops the required gain in a precise logarithmic manner to permit the total response characteristic of the deviec under test to be linearly displayed on a standard dc oscilloscope.

There are four calibrated sensitivity or display ranges under selector switch control from the front panel; the linear range, which is equivalent to a 20 db calibrated range; a 0 to 40 db range; a 0 to 60 db range; and a 0 to 80 db range. In the linear mode of operation, the linear gain control is adjusted for full output on the scope and is representative of a 0 to 20 db display. Further adjustment of the linear control permits uncalibrated linear viewing of the response characteristic down to 80 db.

SECTION 1

INTRODUCTION

1-1 Scope

This publication contains operational and service instructions together with an electronic parts list and connector for the Hewlett Packard RF Operational Amplifier Model 1A-2100.

1-2 Description

The Hewlett Packard RF Operational Amplifier Model 1A-2100 is used in making measurements over the 250 ke to 100 mc range of the resonance of networks, filters and amplifiers, etc., which exhibit dynamic operating ranges down to 0.2 mv. The unit comprises a wide-range band-pass amplifier, a dc coupled rms detector amplifier, a detector with low impedance output for driving an X-Y recorder, an output meter, and a regulated power supply.

The amplifier develops the required gain in a precise logarithmic manner to permit the total response characteristics of the device under test to be linearly displayed on a rectangular oscilloscope.

There are four calibrated sensitivity or display ranges under selector switch control from the front panel. The lowest range, which is equivalent to a 20 db calibrated range, 0 to 10 of ranges 0 to 40 db range and 0 to 50 db range. In the linear mode of operation, the linear gain control is adjusted for full output on the range and is representative of 0 to 20 db display. Further adjustment of the linear control permits recalibrated linear viewing of the response characteristic down to 40 db.

The 40, 60, and 80 db ranges are internally calibrated and require no adjustments for viewing except that the input requirement to the amplifier of 0.5 v rms must be maintained for accurate display results. Associated with the three calibrated ranges are the log-expand function controls, which permit the uncompressed or linear viewing of the first 5 to 8 db of each range. This function is initiated by the expand switch, which simultaneously reduces the output voltage by 40% and energizes the expand circuits. The expand level control is then trimmed for full output on the scope.

The 4-1/2 inch meter provided on the front panel is calibrated in four ranges, 0 to 20 db; 0 to 40 db; 0 to 60 db and 0 to 80 db; and is used for point-by-point response measurements and for calibration purposes.

Tube and component aging and line voltage variation effects have been minimized by a regulated power supply, rf and dc degeneration in all rf amplifier stages, and by compensating circuits and degeneration in the dc amplifier section.

Normal factory alignment and calibration uses an input level of 0.5 v rms as standard procedure. In order to insure a true logarithmic display, this input level must be maintained to ±2%. With this input level it is possible to observe calibrated displays down to 80 db or 0.1 v output.

The input circuitry and calibration adjustments have been designed to allow for recalibration of the instrument with an input level which is ± 3db (.353 to .647 v rms) from the normal .5 v rms required.

1-3 Specifications

The specifications for Model LA-5100 are listed in table I.

TABLE I

SPECIFICATIONS

Frequency Range	500kc to 100mc
Flatness of Response	±1 db
Dynamic Range	-85 db with 0.5 v rms input
Measurements Display	1. Direct-reading meter calibrated in db and volts for point-by-point measurements. 2. Equipped with output jacks for connection to oscilloscope or X-Y recorder.
Metering Ranges	1. 0-20 db variable range for linear presentation. 2. 0-40 db, 0-60 db, and 0-80 db ranges for full-scale logarithmic presentation.
Log Expand Control	Permits expansion of at least the first 5 db of the logarithmic presentations for detailed analysis of pass band.
Log Presentation Accuracy	Better than ±1.5 db except that from 70 to 80 db on the 0-80 db range the accuracy is ±2 db.*
Video Response	Approximately 6.0 microseconds.

* Note: A line voltage change of ±10% will produce an additional ± 1db in log presentation accuracy.

Noise Level	The equivalent input noise is at least 88 db below 1 volt.
Input Impedance	50 ohms bridging
VSWR	Better than 1.2:1 when terminated.
Power Requirements	150 watts at 115/230 volts, 50/60 cycles ac.
Dimensions	7" x 14½" x 19" for standard rack mounting.

SECTION II

OPERATION

2-1 General

Model LA-5100 is completely calibrated, thoroughly checked out, and packed with great care to insure that the delivered instrument will be in perfect operating condition. The procedures outlined in this section will familiarize the user with the instrument and reveal any damage incurred in transit.

2-2 Voltage Source

Model LA-5100 as shipped from the factory is set up for 115 volt 50/60 cycle operation. If equipment is to be operated from a 230 volt source, the unit should be removed from the cabinet and the bottom cover removed to expose terminal board. Remove jumpers from between terminals 1 and 2, and 3 and 4. Connect terminals 2 and 3 with a jumper. Replace cover and remove the self-tapping screws holding the identification plate to chassis. When this plate is turned over it will read "230 v 50/60 cycle". Replace plate.

2-3 Controls Chart

This chart is provided to familiarize the user with all controls and connections on Model LA-5100.

CONTROLS CHART

Front Panel

Name	Schematic Designation	Type	Function
RF IN	J1	BNC Connector	Part of a bridging input with J2 located on

Name	Schematic Designation	Type	Function
			back of instrument. Either jack may be used separately if the other is terminated with the TR-50 supplied.
POWER ON	S3	2position toggle switch POWER ON (down)	Energizes LA-5100 from power source. De-energizes instrument.
EXPAND ON	S4	2 position toggle switch EXPAND ON	Provides expansion of first 5 db of range or more. De-energizes circuit.
EXPAND LEVEL	R86	(down) Potentiometer	
		Full CW	Maximum expansion
		Full CCW	Minimum expansion
RANGE	S1	4-position switch	
		LIN	Linear range (0-20 db)
		40	Logarithmic range(0-40db)
		60	Logarithmic range(0-60db)
		80	Logarithmic range(0-80db)
LINEAR GAIN	R95	Potentiometer	
		CW	Maximum gain
		CCW	Minimum gain

Name	Schematic Designation	Type	Function
METER ZERO	R69	Potentiometer (screwdriver adjustment)	Zeros meter electronically.
METER ON	S2	2 position toggle switch METER ON (down)	Energizes meter circuit De-energizes meter circuit
VIDEO OUT	J3	BNC connector	Front panel video output connection. If back panel video output connection (J4) is used, terminate J3 with 10 k terminating resistor from J4.
		Back - Top Chassis	
FUSE	F1	Slo blo 2 amp Jones socket	Power line protection Power to auxiliary equipment.
		Back Skirt of Chassis	
RF IN	J2	BNC connector	Refer to J1 on front panel
VIDEO OUT	J4	BNC connector	Refer to J3 on front panel
80 80	R88	Potentiometer (screwdriver adjustment)	

Name	Schematic Designation	Type	Function
40/80	R101	Potentiometer (screwdriver adjustment)	
20/80	R105	"	" "
0/80	R108	"	" "
60/60	R90	"	" "
40/60	R99	"	These potentiometers are
20/60	R104	"	used to set the limits
0/60	R107	"	of the various ranges.
40/40	R91	"	They have been carefully
20/40	R97	"	adjusted at the factory.
0/40	R106	"	Do Not attempt to adjust until full instructions are available.
		Inside Chassis	
METER CALIBRATE	R75	Potentiometer (screwdriver adjustment)	Meter calibration
L4	L4	Slug-tuned coils	
L5	L5	"	These coils are in the
L6	L6	"	plate circuits of the
L7	L7	"	various tubes in the RF

Name	Schematic Designation	Type	Function
L8	L8	Slug-tuned coils	amplifier. They have
L9	L9	"	been carefully tuned at
L10	L10	"	the factory. Do Not at-
L11	L11	"	tempt to adjust until
L12	L12	"	full instructions are
L13	L13	"	available.
L14	L14	"	
L15	L15	"	
L16	L16	"	
L17	L17	"	

2-4 Preparation for Operation

1. Plug LA-5100 into proper power source and allow instrument to warm up for at least 30 minutes.
2. Place METER ON switch in the OFF position and check mechanical zero of meter. Adjust if necessary.
3. Place RANGE switch in LIN position, LIN GAIN control full CCW, and METER ON switch to METER ON position.
4. Adjust METER ZERO control to make meter read infinity (extreme left of scale). The instrument is now ready for operation.

2-5 Calibration Check

NOTE: EXPAND switch must be OFF to obtain calibrated output.

1. Apply signal within range of instrument (500 kc to 100 mc) at 1/2 volt RMS level.

NOTE: Model LA-5100 has been calibrated with a 10 mc signal at the factory. There will be slight variations at other frequencies.

2. Place RANGE switch at 40, 60, and 80 positions in turn. Meter should read 0 db at each position.

3. Reduce input 20 db (20 db pad). Meter should now read 20 db at each of the range positions (40, 60, and 80).

4. Reduce input 40 db and check 40, 60, and 80 positions of RANGE switch. Meter should read 40 db.

5. Reduce input 60 db and check 60 and 80 positions of RANGE switch. Meter should read 60 db.

6. Reduce input 80 db and check 80 position of RANGE switch. Meter should read 80 db.

2-6 Check Gain

1. Remove pad from input and replace with a variable attenuator.

2. Turn LINEAR GAIN control fullCW and adjust input signal level to obtain an 0 db meter reading. The measured input should now be no higher than 77db below 1 volt.

3. Check video output to see that it measures 1 volt dc when meter reads 0 db.

4. Turn LINEAR GAIN control full CCW. The meter should now read infinity.

2-7 Check Expand Switch Operation (40, 60, or 80 db ranges)

1. Apply signal at 1/2 volt RMS level.

2. Place EXPAND switch in ON position, and turn EXPAND LEVEL control full CCW. Meter should drop to approximately mid-scale.

3. Turn EXPAND LEVEL CW. Meter needle should go to 0 db and beyond.

2-8 Connecting a Device to be Tested

1. Connect the device under test between the RF signal source and the INPUT jack on Model LA-5100. Connect VIDEO OUT jack on LA-5100 to vertical input of scope and the horizontal output of the sweep generator to the horizontal input of the scope.

   NOTE: It is recommended that the meter on LA-5100 be turned OFF when sweeping at slow rates to avoid excessive motion of the needle.

2-9 Reading Insertion Loss of Device Under Test Directly

1. The insertion loss of a device under test may be read directly on the meter or scope if a signal measuring 1/2 volt RMS is fed to the device under test.

SECTION III

CIRCUIT DESCRIPTION

3-1 General

3-1.1. Any amplifier whose input-output curve follows the relationship $E_O = k_1 \log_{10} E_i + C$ is a logarithmic amplifier. When the input level of such an amplifier is varied logarithmically, the output may be conveniently displayed as a linear function.

3-1.2. The basic logarithmic function of the LA-5100 is developed by using the transfer characteristics of the cascaded rf amplifier tubes as controlled by a dc grid bias feedback system. The particular type tubes used permit the desired logarithmic relationship between input and output to be maintained with high degree of accuracy.

3-2 Circuit Description

3-2.1 The LA-5100 comprises five states of wide-band rf amplification, a diode detector doubler, and a two-stage dc amplifier. The rf amplifier uses four tube pairs, each pair incorporating series-shunt and series peaking, with cathode degeneration, both ac and dc in each pair. The cathode degeneration provides gain stability with tube aging and filament temperature fluctuation, and insures rf gain similarity between units.

3-2.2. The first rf amplifier, a remote cut-off type 6EH7, provides linearity over the full input range. The last stage of amplification is operated at full gain with fixed grid bias in order to maintain a sufficient rf voltage level for linear diode detection. The voltage developed across the cathode resistor of this stage, because of its low impedance characteristic, is used to supply bias for the curve-shaping diodes in the AGC amplifier section.

3-2.3. The output of the negative-going detector is fed to the first section

of the dc amplifier which provides AGC gain to the second dc amplifier stage, along with a low output impedance and phase inversion for the required positivegoing meter and output circuits.

3-2.4. The second section of the dc amplifier was designed as an operational amplifier in order to satisfy the following stringent requirements; stability, phase inversion for the required AGC signal polarity, a low and precise output impedance for driving the AGC line, a high level input signal handling capability, a convenient and accurate gain adjustment, and permissible gain settings above and below unity.

3-2.5. Front panel selection of the various dynamic ranges is provided for by a multisection range switch. The functions of this control are to switch in fixed and variable rf grid bias levels, and to select the appropriate calibration adjustment controls.

3-2.6. The function of the expand circuit is to disable the dynamic action of the AGC voltage, at a particular dc level, under control of the Expand Level adjustment. The diode associated with the arm of the control is normally biased to represent a high impedance, until the AGC voltage level is equal in magnitude to the value at the arm of the control. At this time the diode conducts, representing a low impedance, and sets the value of the AGC line at the dc level of the Expand Control. This permits the rf amplifier, and hence the output display, to be linear during the time the diode is conducting.

SECTION IV

MAINTENANCE

4-1 Scope

4-1.1. This section contains an rf alignment procedure, control circuit adjustment procedures, an electronic parts list, and complete schematic diagrams for Model LA-5100.

4-2 General

4-2.1. Model LA-5100 is designed to give long service with a minimum of maintenance. The required maintenance comprises the replacement of tubes, the necessary touch-up of the rf response of the unit after such replacements, and the occasional re-adjustment of the control circuits.

4-3 RF Alignment Procedure

4-3.1. Test Equipment Recommended

Sweep Generator Jerrold Model 900-A

Variable Attenuator Jerrold Model AV-50-2

Electronic Coaxial Switch Jerrold Model FD-30

Oscilloscope Standard dc

Marker Generator (for markers at 45, 80, and 100 mc)

4-3.2. Step-by-Step Procedure

1. Interconnect equipment with jumper cables. Marker generator output to marker input on 900-A sweep generators, SWEEP OUTPUT of 900-A to unmarked fitting at lower right of FD-30, unused fitting on D-50 detector on 900-A to B fitting in right-hand group of fittings on FD-30 (be sure other fitting on D-50 is terminated), VERT OUT fitting on 900-A to B fitting in left-hand

group of fittings on FD-30, HOR OUT fitting on 900-A to horizontal input of oscilloscope, vertical input of oscilloscope to unmarked fitting at lower left of FD-30, VIDEO OUT fitting of LA-5100 to A fitting in left-hand group of fittings on FD-30 (be sure unused VIDEO OUT fitting on LA-5100 is terminated in 10 k ohms), RF IN fitting on LA-5100 to one fitting on attenuator AV-50-2 (be sure unused RF IN fitting is terminated in 50 ohms), A fitting in right-hand group of fittings on FD-30 to un-used AV-50 fitting.

2. Connect Models LA-5100, 900-A, FD-30, marker generator, and oscilloscope to 117-v ac power source and turn power switch on LA-5100 to POWER ON position.
3. Set VHF-UHF switch on 900-A to VHF position, detector switch to INT position, center frequency to 55 mc, and sweep width to cover 0 to 110 mc.
4. Set AV-50 to provide 33 db attenuation.
5. Set FD-30 to TEST position.
6. Set vertical sensitivity on oscilloscope to 40 mv per cm.
7. Turn power switches on other test equipment to ON position and allow one hour for warm-up.
8. Adjust ALC control on 900-A to permit 200 mv output as observed on scope.
9. Adjust horizontal control on oscilloscope so that entire trace is on scope .
10. Set FD-30 to AUTO position.
11. Set 40-60-80-LIN switch on LA-5100 to LIN position, place meter switch

in off position, place expand switch in off position, and adjust LINEAR GAIN control to provide a convenient size test wave-form: relative to the reference wave-form.

12. Insert markers at 45, 80, and 100 mc as required.

13. Adjust coils on LA-5100 as designated in Figure 1 to obtain the overall response curve shown in Figure 1.

    NOTE: Since there is interaction between these adjustments, it may be necessary to make a series of small adjustments until the best response is achieved.

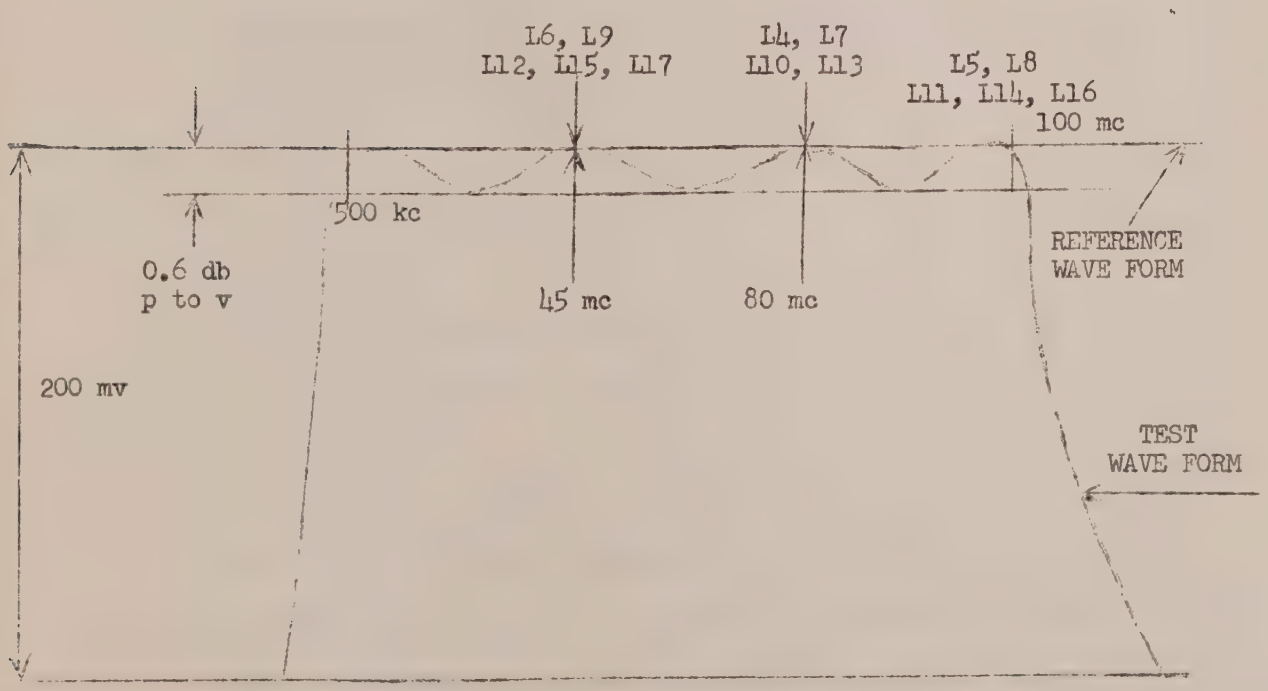


Figure 1: Typical Response of RF Section of LA-5100

14. This completes the rf alignment of the LA-5100. Disconnect all test equipment and LA-5100 is now ready for control circuit adjustments.

4-4 Meter Zero Adjustment

4-4.1. Step-by-Step Procedure

1. Do not connect any test equipment to Model LA-5100 for this test. Plug LA-5100 into 117 v-ac source, turn power switch to POWER ON position, and allow unit to warm up.

   NOTE: It is assumed that rf alignment is correct.

2. Place 40-60-80-LIN switch in LIN position, meter switch in METER ON position, expand switch in off position, and turn LINEAR GAIN control full ccw.

3. Adjust METER ZERO control until meter pointer is on 0 at the left of the upper meter scale.

4-5 Meter Calibration

4-5.1 Test Equipment Necessary

CW Signal Generator

Jerrold Variable Attenuator Model AV-50-2

Calibrated dc voltmeter (0.5% accuracy)

4-5.2 Step-by-Step Procedure

1. Interconnect test equipment. Output of cw signal generator to one fitting of AV-50-2, other fitting of AV-50-2 to RF IN fitting on LA-5100 (be sure other RF IN fitting is terminated in 50 ohms), VIDEO OUT fitting on LA-5100 with calibrated voltmeter across it (be sure other VIDEO OUT fitting is terminated in 10 k ohms).

2. Set cw signal generator to provide 0.5 v rms at 10 mc (approx).

3. Set AV-50-2 for 20 db attenuation.

4. Turn meter switch to METER ON position.

5. Adjust LINEAR GAIN control to provide 1.0 v dc as measured on calibrated voltmeter across VIDEO OUT of LA-5100.

6. Adjust METER CAL control on LA-5100 for full scale on LA-5100 meter.

7. Repeat steps 5 and 6 as required until meter on LA-5100 reads full scale with 1.0 v dc ±0.1% reading on calibrated voltmeter across VIDEO OUT. Then tighten lock nut on METER CAL pot. Disconnect voltmeter from VIDEO OUT fitting.

4-6 Control Adjustments

NOTE: This series of adjustments will be made with test equipment and LA-5100 interconnected as in paragraph 4-5.2 Step 7. It is assumed that rf alignment, meter adjustment and meter calibration are correct.

4-6.1 80 db Range Adjustments

4-6.1.1 Step-by-Step Procedure

1. Place 40-60-80-LIN switch in 80 position.

2. Check that output of cw signal generator is 0.5 v rms at 10 mc (approx.).

3. Provide 70 db attenuation on AV-50-2

4. Adjust 70/80 pot on rear of LA-5100 (80/80 on some units) till meter reads 70 db on 80 db scale.

5. Change attenuation on AV-50-2 to 40 db.

6. Adjust 40/80 pot till meter reads 40 db on 80 db scale.

7. Repeat steps 3, 4, 5, and 6 until both settings are correct.

8. Change attenuation on AV-50-2 to 20 db

9. Adjust 20/80 pot till meter reads 20 db on 80 db scale.

10. Change attenuation on AV-50-2 to 0 db

11. Adjust 0/80 pot till meter reads 0 db on 80 db scale

12. Repeat steps 8, 9, 10, and 11 until both settings are correct.

13. Re-adjust all four controls, as required, until all settings are correct.

14. Provide 80 db of attenuation on AV-50-2 and check to see that meter reads 80 db on 80 db scale.

4-6.2. 60 db Range Adjustment

4-6.2.1. Procedure

The range adjustment for the 60 db range is carried out in the same manner as for the 80 db range except that the 60 db range controls are used with the appropriate AV-50-2 settings to obtain the proper meter readings on the 60 db meter scale.

4-6.3. 40 db Range Adjustment

4-6.3.1 Procedure

The range adjustment for the 40 db range is carried out in the same manner as for the 60 db range except that the 40 db range controls are used with the appropriate AV-50-2 settings to obtain the proper meter readings on the 40 db meter scale.

REPLACEMENT PARTS LIST

SCHEM. DES.	DESCRIPTION	PART NO.
	CAPACITORS	
C-1,48,53,54,57,58,59,67,68, 69,70,71,72,73,74,75	1000 pf Disc.	123-115
C-2,8,16,20,26,29,36,37,45,60	470 pf Ceramic	123-113
C-4,7,15,19,25,34,35,41	220 pf Ceramic	123-119
C-5	68 pf TCZ	121-029
C-6,11,13,18,24,28,33,40,42	.05 mf Tubular @200v- Astron ML-2-05	125-053
C-9,10,21,22,30,31,38,44,46	.5mfd Tubular 200v- Astron MQCS-2-5	125-045
C-12,17,23,27,32,39,43	62 pf TCZ	121-028
C-14	3000 pf Mica CM-20B-302K	126-070
C-47,49,65,76	1000 pf Feed Thru	129-108
C-50	2200 pf Mica CM-19B-222K	126-024
C-51	330 pf Mica	126-038
C-52	150 pf Mica	126-008
C-55	.01 mfd disc.	124-031
C-56,63	.1 mfd Tubular 200v	125-002
C-61 A-B	40-40 mfd Electrolytic 350v	127-605
C-62A,B,C	40-40-40 mfd Electrolytic 350v- Aerovox Common Pos.	127-608
C-63	50 pf Ceramic	123-122
C-64	.047 mfd Tubular 200v	125-001
	CHOKE	
L-1	RF Choke Coil, 500 uh	157-013

SCHEM. DES.	DESCRIPTION	PART NO.
	FUSE	
F-1	2 amp. 3AG 125v (1A-3AG Slo-Blo-250v, #101-345, for 230v Operation)	101-352
	LAMPS	
I-1,2	G.E. #328	102-004
	METER	
M-1	Meter	B171-210
	RECTIFIERS	
CR1,5	Diode, 1N695	139-150
CR2,3,4	Diode, 1N34	139-100
CR7,8,9	ST CER 72	137-711
	RESISTORS	
R-2,10,11,16,24,30,38,44,50,61,63	10K 1/2w 5%	112-485
R-3	47k 1w 1% - IRC-DCF	115-048
R-4	750 ohm 1/2w 5%	112-347
R-5,20,34,48	240 ohms ½w 5%	112-284
R-6,14,21,27,35,41,49,56	16 ohms ½w 5%	112-137
R-7	2400 ohm 1/2w 1% - IRC-DCC	115-055
R-8,71	237 ohm 1/2w 1% - IRC- DCC	115-113
R-9,23,29,37,43,47,53,68,79, 121,122	1k 1/2w 5%	112-359
R-12,13,25,26,39,40,52,54,55,60, 76,123,124	100 ohm ½w 5%	112-233
R-15,22,28,36,42,51,57,67,70	1k 1/2w 1% - IRC-DCC	115-128
R-17,31,45,48	24 ohm ½w 5%	112-158
R-18,32,46,59	160 ohm ½w 5%	112-263

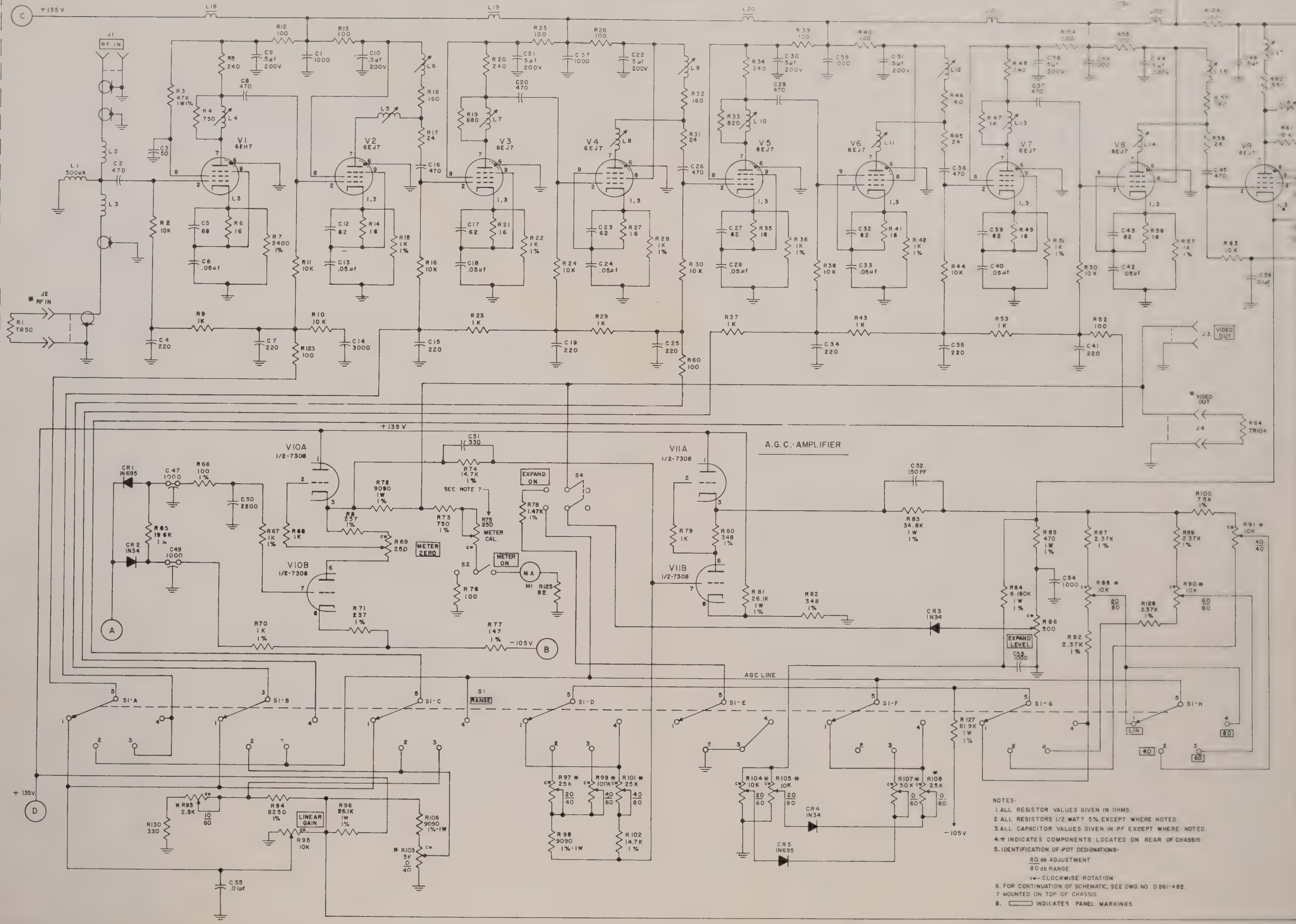
SCHEM. DES.	DESCRIPTION	PART NO.
R-19	680 ohm 1/2w 5%	112-338
R-33	820 ohm 1/2w 5%	112-350
R-62,130	330 ohm 1/2w 5%	112-296
R-65	19.6k 1/2w 1% - IRC-DCC	115-112
R-66	100 ohm 1/2w 1% - IRC-DCC	115-124
R-69,75	Pot 250 ohm CLU 2511	118-097
R-72,98,106	9090 ohm 1w 1% - IRC-DCC	115-114
R-73	750 ohm 1/2w 1% - IRC-DCC	115-102
R-74,102	14.7k 1/2w 1% - IRC-DCC	115-116
R-77	147 ohm 1/2w 1% - IRC-DCC	115-127
R-78	1.47k, 1/2w 1% - IRC-DCC	115-126
R-80,82	348 ohm 1/2w 1% - IRC-DCC	115-119
R-81,96	26.1k 1w 1% - IRC-DCF	115-133
R-83	34.8k 1w 1% - IRC-DCF	115-130
R-84	6.19 ok 1w 1% - IRC-DCF	115-118
R-85	470 ohm 1w 1% - IRC-DCF	115-135
R-86	Pot 500 ohm CU 5011 w/$\frac{1}{2}$ Shaft	118-103
R-87,89,92,128	2.37k 1/2w 1% - IRC-DCC	115-131
R-88,90,91,104,105	Pot 10k CLU 1031	118-026
R-93	Pot 2.5k CLU 2521	118-037
R-94	8250 ohm 1/2w 1% - IRC-DCC	115-125
R-95	Pot 10k CU 1031	118-034
R-97,101,108	Pot 25k CLU 2531	118-027
R-99	Pot 100k CLU 1041	118-022
R-100	7.5k 1/2w 1% - IRC-DCC	115-121

SCHEM. DES.	DESCRIPTION	PART NO.
R-103	Pot 5k CLU 5021	118-023
R-107	Pot 50k CLU 5031	118-024
R-110	100 ohm 10 w - W.W. Type FRL-10 Term. #10L	113-017
R-111	15 ohm 2w 10%	112-133
R-112	220 ohm 2w 10%	112-280
R-113,117	510k 1/2w 5%	112-704
R-114,115,116	2k 10w - W.W. Type FRL-10 Term. #10L	113-007
R-118	330k 1w 1% - IRC-DCF	115-101
R-119	240k 1w 1% - IRC-DCF	115-050
R-120	4.7 ohm 1w 10%	112-103
R-125	82 ohm 5% 1/2w	112-224
R-127	61.9k 1w 1% - IRC-DCF	115-129
R-129	100k 1w 10%	112-615
	SWITCHES	
S-1	Wafer	C161-130
S-2	Toggle-spdt	162-007
S-3	Toggle-spst	162-001
S-4	Toggle-dpdt	162-008
	TRANSFORMER	
T-1	N.T.C. P-386A	C141-188
	TUBES	
V-1	6EH7	131-339
V-2,3,4,5,6,7,8,9	6EJ7	131-340
V-10,11	7308 Amperex	131-603

SCHEM. DES.	DESCRIPTION	PART. NO.
V-12	6DQ6-B	131-350
V-13	6AU6	131-308
V-14	OB2	132-102

SCHEMATIC
LA-5100

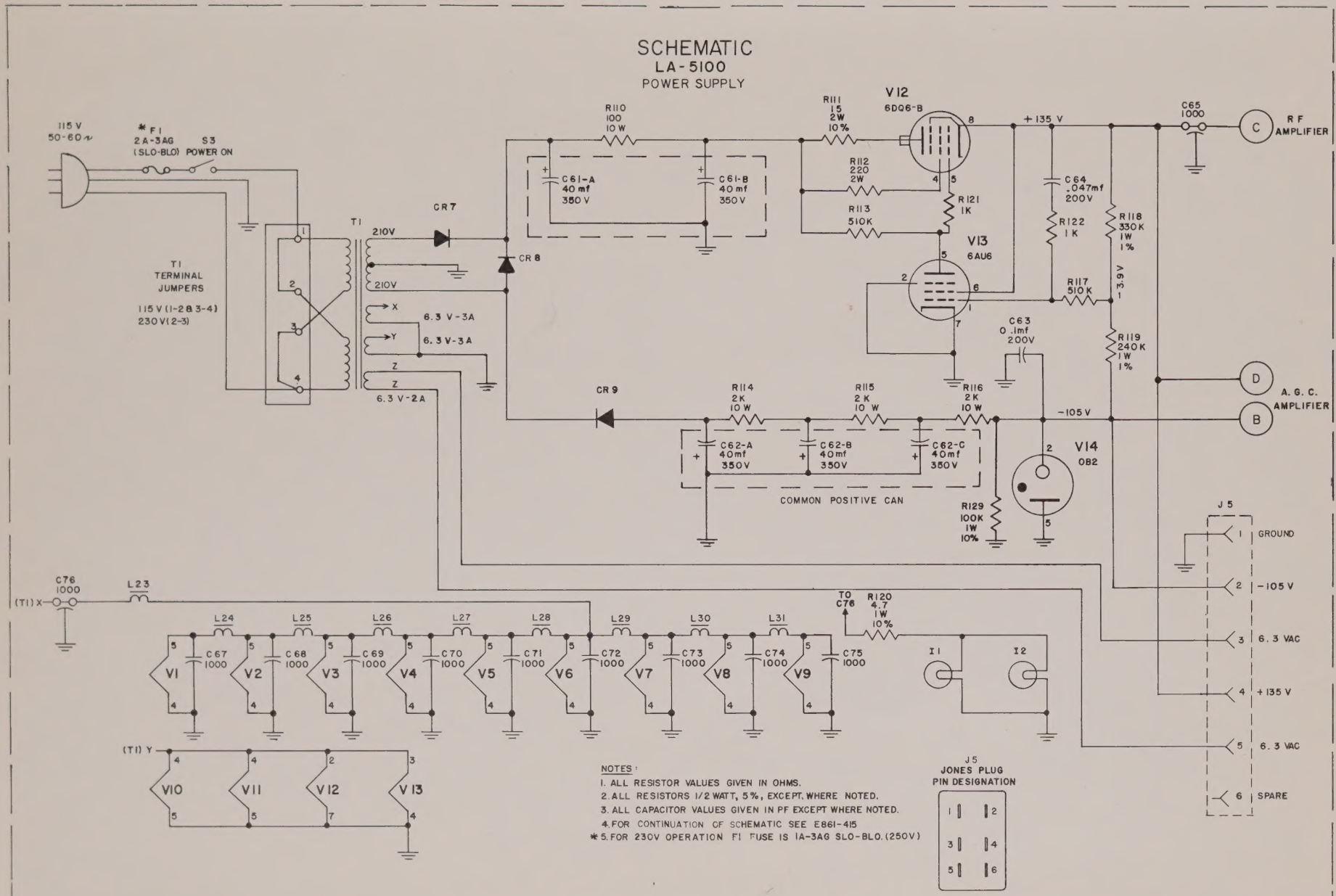
R. F. AMPLIFIER



NOTES:

1. ALL RESISTOR VALUES GIVEN IN OHMS
2. ALL RESISTORS 1/2 WATT 5% EXCEPT WHERE NOTED
3. ALL CAPACITOR VALUES GIVEN IN PF EXCEPT WHERE NOTED.
4. * INDICATES COMPONENTS LOCATED ON REAR OF CHASSIS
5. IDENTIFICATION OF POT DESIGNATIONS:
   - 80 db ADJUSTMENT
   - 80 db RANGE
   - cw - CLOCKWISE ROTATION
6. FOR CONTINUATION OF SCHEMATIC, SEE DWG NO. D 861-482.
7. MOUNTED ON TOP OF CHASSIS
8. ▭ INDICATES PANEL MARKINGS

SCHEMATIC
LA-5100
POWER SUPPLY



NOTES:

1. ALL RESISTOR VALUES GIVEN IN OHMS.
2. ALL RESISTORS 1/2 WATT, 5%, EXCEPT WHERE NOTED.
3. ALL CAPACITOR VALUES GIVEN IN PF EXCEPT WHERE NOTED.
4. FOR CONTINUATION OF SCHEMATIC SEE E861-415
5. *FOR 230V OPERATION F1 FUSE IS 1A-3AG SLO-BLO. (250V)

J5
JONES PLUG
PIN DESIGNATION

D 861-482

93359